

BULLETIN OF MISCELLANEOUS INFORMATION No. 6 1929 ROYAL BOTANIC GARDENS, KEW

XXIX.—THE IMATONG MOUNTAINS, SUDAN.

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The Imatong Mountains, the highest point of which is Mt. Kineti, 10,414 ft., are situated between 4° and $4^{\circ}30'$ N and $32^{\circ}20'$ and 33° E, just north of the boundary between the Anglo-Sudan and Uganda. Until recently these mountains had not been visited,* and were known locally only by the names of the tribes inhabiting the hills and different parts of the mountain plateau, whilst the individual peaks were referred to by the names of the rivers to which they gave origin.

In The Geographical Journal, May 1929, there is a map accompanying Mr. Arnold Hodson's article on Journeys from Maji, South-West Abyssinia. The map has been prepared from the compilation of the Sudan Government Survey Department and is the first map to show these mountains and recognise their name as the Imatong Mountains.

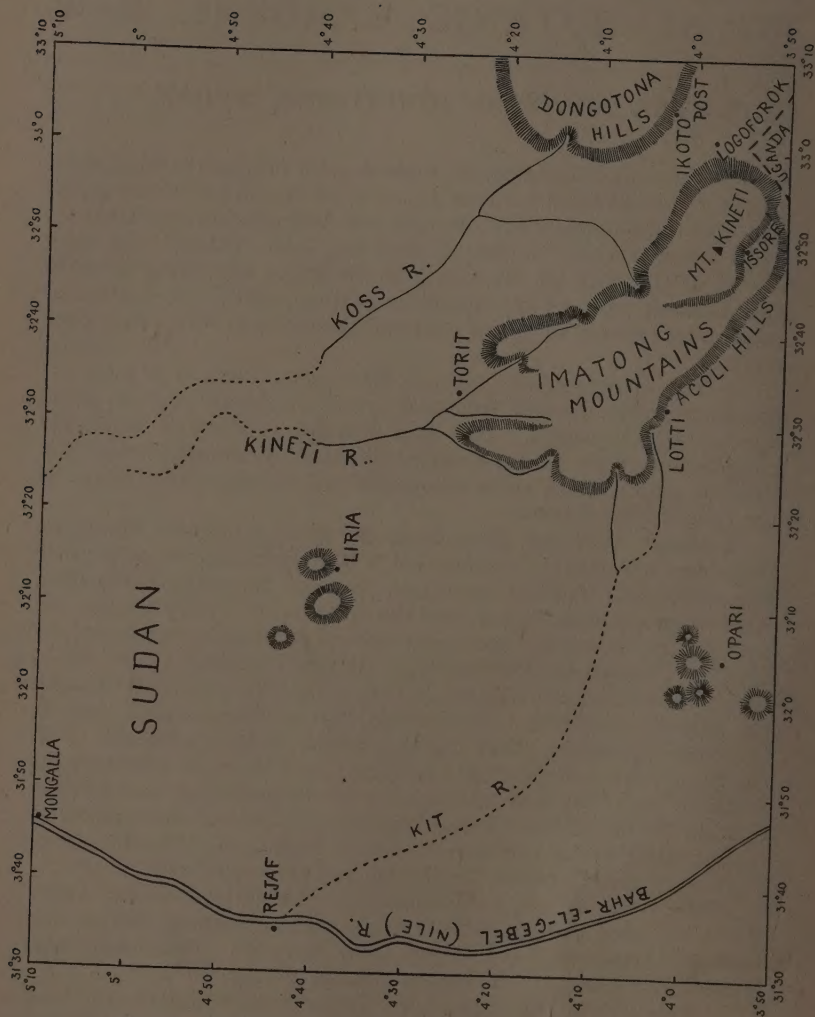
Although they rise direct from the general plain of Mongalla, they form a northern continuation of the upthrusts which provide the great East African mountain systems, including Ruwenzori, Kilimanjaro, Kenya, Elgon, and the Aberdares. They are not the only group, however, and other mountain masses, such as the Dodingas, rise to the east forming "stepping stones" to the Abyssinian plateau, whilst, westwards, isolated gebels connect them with the Nile-Congo divide. Northwards, through the group known as the Nuba Mountains, they connect, again by isolated gebels, with the great trans-Sahara range of which Gebel Marra in Darfur is the southern peak. In fact, throughout the Anglo-Sudan, north of the Sudd in Upper Nile Province, these solitary, conical, flat-topped, or razor-backed, rocky upthrusts are to be seen rising abruptly out of the tree-covered plains or the Nubian and Libyan deserts.

Little is known about the vegetation of the higher peaks. Gebel Marra has been visited and a few specimens obtained†, but no collections, hitherto, have been made on the high mountains immediately north of the Sudan-Uganda border.

In February last an opportunity occurred of visiting the Imatong group, and one hundred specimens were obtained from the different

*Geographical Journal, vol. 49, pp. 201–208.

†The Geographical Affinities of the flora of Gebel Marra. R. Good, The New Phytologist, xxiii, No. 5, pp. 266–281.



The south-central part of Mongalla Province, Anglo-Sudan.

vegetation zones.* It appears that a new northern record has been obtained for the mountain flora of the East African equatorial mountains, and that a further link has been established with the vegetation of the Abyssinian plateau and the high mountains of west equatorial Africa.

The approach to the Imatongs was from the west, and motor transport was possible from Rejaf on the Bahr-el-Gebel, the southern terminus of the Nile service of steamers from Khartoum. The river is not navigable southwards owing to rapids, but Rejaf is the centre of dry-season motor car services from Nairobi and Kampala, and there is a daily service of lorries along an excellent all-weather road from Aba in the Belgian Congo. Eastwards, however, there is no regular traffic and the dry-season motor car tracks have only recently been opened up by the District Commissioner.

Rejaf was left early in the morning, but owing to engine trouble Opari, the headquarters of the District, was not reached till five in the evening. For the first 40 miles the road runs southwards parallel with the Bahr-el-Gebel and at about 8 miles distance. The vegetation is that typical of the river basins of this part of the Sudan, dwarf tree species of *Acacia*, *Terminalia*, *Euphorbia*, *Tamarindus*, *Kigelia*, *Zizyphus* and *Balanites*, standing isolated over a "tall-grass" ground-cover, and gnarled, blackened, and twisted by the annual fires.

For the last 40 miles of the journey the road went eastwards, and ascended to ground which was generally about 2000 ft. altitude. Here the tree constituents of the vegetation changed, and representatives of the next southern great transcontinental belt of vegetation took their place. Noticeable amongst them were species of *Erythrina*, *Dombeya*, *Azelia*, and *Butyrospermum*. The general physiognomy of the vegetation remained the same, and the tall dry herbs and grass provided abundant inflammable material for the fires, which, in many cases, kept tall trees to the form of a stake or stunted bush. The brilliant scarlet flowers of *Erythrina tomentosa* R.Br. (22) and the masses of cherry-like blossom of *Dombeya reticulata* Mast. (21) were a welcome relief in a dry undulating landscape.

The following day motor cars were used as far as Lotti, a further 40 miles eastwards. The route crossed the wide sweeping undulations of the country, gradually mounting up to some 3,500 ft. Although big game abounds, few animals were seen, as the motor car disturbed the general quietude of these grassy tracts and gave good warning of our approach. One small herd of giraffes was passed and some gazelles and antelopes.

On approaching the base of the hill on which the Lotti Rest House is built, and where the motor car track ends, a belt of closed fringing forest was crossed. This was the first piece of Closed

*The collection is deposited in the Herbarium at Kew. The serial numbers given after botanical names refer to the collector's field numbers of this collection.

Equatorial Forest seen on the journey southwards through Egypt and the Sudan, and is the northern limit, in these parts, of the great Cameroons-Congo forest, which crosses the Rift Valley in places, penetrates the ravines, and pushes along the valleys of Uganda towards Abyssinia. This belt was composed of tall forest trees with good boles and buttresses, and with crowns completely closing the canopy. Lianes were plentiful, and the shrub curtain of the equatorial forest prevented one seeing more than a few yards in any direction. *Alstonia*, *Entandrophragma macrophyllum* A. Chev. (15), *Khaya grandifoliola* C.DC. (24), and *Chlorophora excelsa* Benth. & Hook. f. (19, 20), were amongst the largest trees, whilst wild Coffee, *Coffea robusta* Linden (10, 11), and Rubiaceae and Acanthaceae shrubs helped to form the lowest stratum of the canopy. The belt was only $1\frac{1}{2}$ miles wide in this part but continued eastwards round the southern base of the foothills towards Uganda.

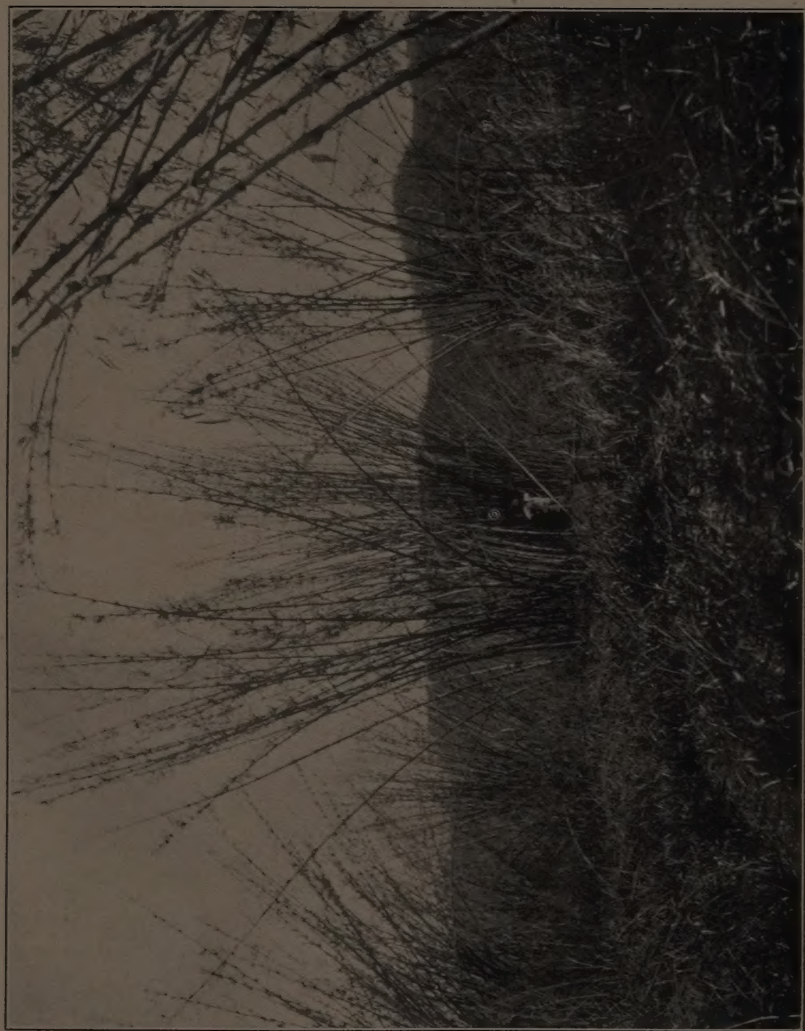
The Rest House at Lotti is built on a little spur of the foothills, some 500 ft. above the plain and is reached by a narrow steep track which is found rather trying by travellers who have come the last thousand miles by steamer and motor car. One is well rewarded for the short climb, for an excellent view is obtained southwards over the undulating country to the mountains beyond Kajo Kaji and Nimule, whilst at dusk the grass fires which rage at this time of the year and work their way up the mountain sides above provided a brilliant spectacle.

During the night a local edition of a "haboob" provided an unpleasant experience. The wind roared over the mountains carrying clouds of dust and debris, but no rain fell. Owing to the recent fires over the country-side partially burnt and charred vegetable matter was blown over everything, and camp kit, clothes, and all else were covered with a greasy black deposit.

From Lotti the march along the Acoli Hills was begun. These foothills, which rise to some 7000 ft., encircle the west and south aspects of the Imatongs, and are inhabited by the Acolis from whom they take their name. Owing to the preventive measures against sleeping sickness the Acolis are all living above the 4000 ft. contour, whilst they go down to their farms in the plains daily. They are a bright, cheerful people, and seem to have thrown off the sleeping sickness scourge since they have moved their homes to the high ground, but the daily walk to their farms below is somewhat of an undertaking.

Carriers were obtained for each day's march from the village where the nightly halt was made. The track followed the line of villages around the mountain side, so that no difficulty was experienced with regard to carriers. The track itself, however, was difficult for, for the most part, it took a bee line from one hill top to the next and this entailed many steep descents and equally steep ascents during each day's march. At other times it was cut along the hill side, with a drop of 1500 ft. to the rolling plains to the

PLATE VIII



For explanation of Plates, see page 197.

F.B.

[To face page 180.]

PLATE IX

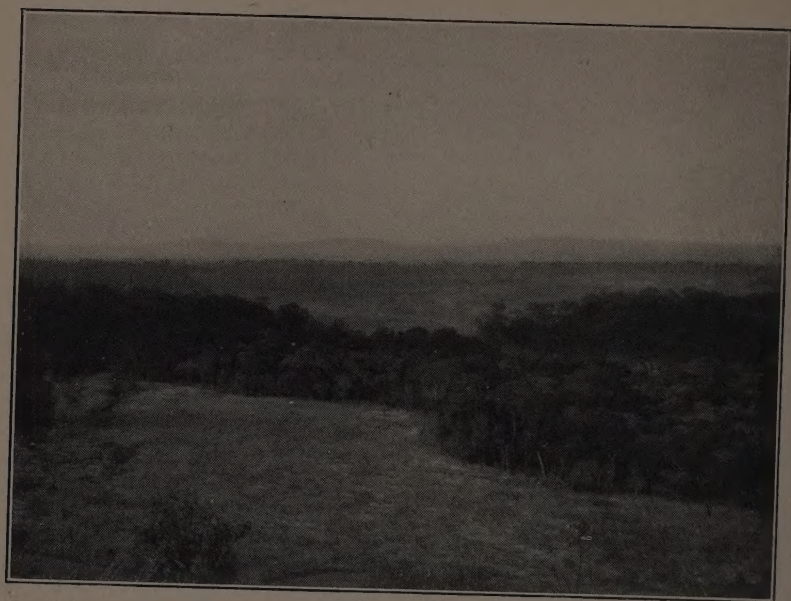


Fig. 1.

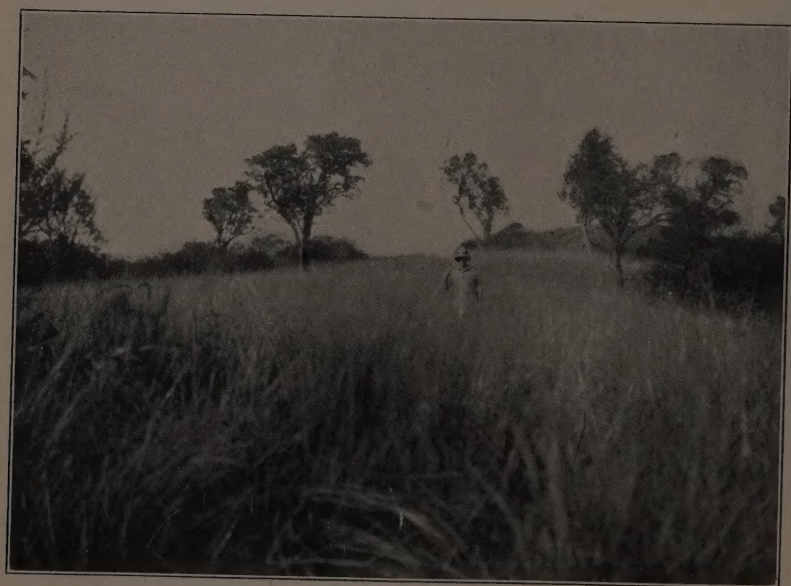


Fig. 2.

south, and with the steep mountain sides above. Again at intervals the hill tops fell back in a semicircle and many hill basins and hanging valleys, each of several thousand acres, were found between 4000 and 5000 ft. altitude.

The types of vegetation alternated. The hill sides were covered with dry grass above which the isolated trees stood out. At a distance these looked like grassy swards, but directly they were entered the 12 to 15 ft. grasses, chiefly *Hyparrhenia cymbaria* Stapf (27) and *Pennisetum purpureum* Schum. (29), obscured all view. In the ravines the Closed Forest threaded its way up the mountains along the banks of the streams, which at these heights were perennial. *Khaya grandifoliola* C.DC. (24) appeared in nearly all these strips of forest and its open capsules were common on the forest floor. The contrast between these dry hot hill sides and the shady coolness of the banks of the forest-covered streams was striking in its abruptness and intensity.

A digression was made at the end of the second day's march among the Acoli Hills, and a trail followed southwards towards a basin containing a stretch of closed forest some hundreds of acres in extent. This is known as the Laboni Forest and was reported to contain much wild Coffee. It is rarely visited as the country is uninhabited along the Uganda border, and a herd of some 200 elephants effectively polices the area against the occasional hunter.

The last hour's march towards this forest is through a tract occupied exclusively by the tufted bamboo *Oxytenanthera abyssinica* Munro (51), which extends to several thousands of acres and effectively prevents any other type of vegetation from existing on the same site. There was no breeze and the spreading crowns of the bamboo clumps were much too thin to afford any protection against the blazing sun. Occasionally streams were crossed, and here were seen for the first time *Dracaena fragrans* Gawl. (53), *Phoenix reclinata* Jacq. (50), and *Senecio multicorymbosus* Klatt (52), whilst epiphytes such as the shield ferns *Platyserium angolense* Welw. (30), and *Drynaria Willdenovii* T. Moore (54), and the lichens *Usnea longissima* Ach. (57), *U. florida* Web. (57), and *Parmelia perlata* Ach. (58) betokened the approach of the moister atmosphere of the higher mountain sides.

To reach the patch of forest a further stretch of tall Grass—fire-swept—woodland in a basin of the hills had to be crossed, and some of the plants representing this type of vegetation were collected. Some parts of this grassland had recently been burnt and here were many plants whose flowers were borne on short herbaceous stems up to 12 inches high arising from buried woody rootstocks. Amongst them were the mauve-flowered *Ruellia sudanica* Lind. (32); the yellow *Crotalaria senegalensis* Bacle (33); *Trichodesma physaloides* A.DC. (34) with white petals streaked at the base with brown, and white anthers; *Sonchus Elliotianus* Hiern (35) with dark orange ray florets and yellow disk; the purple-flowered *Scutellaria*

pauciflora Baker (38) ; and *Peristrophe usta* C.B.Cl.(41) with mauve flowers. Where the grass was still standing *Clerodendron cordifolium* A. Rich. (48, 49) commonly occurred, with its whitish green flowers, scarlet at the base, or its dark green shining fruit partially enclosed by the claret-coloured calyx. One of the commonest trees, in flower at this time, was *Combretum laboniense* M.B. Moss (45).

The following morning a return trail was followed which led through part of the Laboni forest. The wild Coffee (*C. robusta* Lind., 40) was a lovely sight and is evidently growing under ideal conditions. It was in full bloom and the long spreading branches were loaded with pure white flowers whilst the ground around was strewn with berries. The predominant trees were isolated and some forty yards apart ; the closed canopy was provided by trees from 20 to 30 ft. high. Lianes and leafy curtains of other climbers and shrubs filled in the understructure of the forest so that herbs were practically absent. A specimen of *Polystictus xanthopus* Fries (60) was growing on a fallen log. Where sufficient light penetrated the canopy the Coffee had germinated and sturdy seedlings were growing up to fill the gap. A collection of the shrubs growing in association with the Coffee was made. These proved to be *Argemuellera macrophylla* Pax (36) ; *Hormogyne altissima* A.DC. (37) ; *Ouratea densiflora* De Willd. & Dur. (39) ; *Coffea spathicalyx* K. Schum. (47) ; *Whitfieldia longifolia* T. And. (42) ; *Lankesteria elegans* T. And. (43) ; *Kigelia aethiopica* Decne. (44) ; and *Belonophora glomerata* M. B. Moss (46).

The next day camp was moved to the head of the valley, at Issore (Onyira), at an altitude of 4616 ft. A neck of higher ground was crossed during the day's march and from here it was seen that the Combretaceous trees of the Tall Grass-Woodland were replaced rather higher up the mountain side by a conspicuously flat-topped *Acacia* (*A. abyssinica* Hochst., 55), whilst the grasses themselves were only from 6 to 8 ft. high. In the ravines the mountain flora was beginning to appear and the first specimens of the giant *Lobelia Giberroa* Hemsl. (56), some 18 ft. tall, were collected.

The bracken fern, *Pteridium aquilinum* Schott. (28), was now common and came up freely around the village wherever any attempt at cultivating the ground had been made.

The following morning the great ascent of the mountain plateau was begun soon after dawn. For the first four hours the climbing was particularly trying ; the going was bad, the tall grasses were constantly slashing the face, whilst their cane-like stems lying obliquely across the track were a perpetual source of slipping and stumbling. At times the track came into the open and bare sheets of rock had to be surmounted. Luckily it was too early in the day for them to have become heated. The Aloes, which projected from every crack of the rocky surfaces, bore testimony to the heat in the dull red colouring of their leaves.

The weather was perfect, and by the time the mountain vegetation was reached at about 8000 ft. there was a strong wind blowing which was very invigorating and made the remainder of the day's march less strenuous. The neck of Mt. Kineti was crossed to the south of the top of the mountain at about 9000 ft. altitude, and then the track wound along the mountain side through meadows of short grass, or through the ravine forests composed principally of *Podocarpus milanjanus* Rendle (85, 104), and festooned with mosses, chief amongst which was *Pilotrichella ampullacea* Broth. (88). A mountain bamboo, a species of *Arundinaria* (94) near *A. alpina* K. Schum., appeared as a fringe to the forests. To reach the camp, a collection of grass huts—Kippia, 8744 ft., a valley had to be descended and a further climb of some hundreds of feet was entailed. The day's march took just under eight hours continuous walking and climbing.

Time only permitted one day to be spent on the mountain plateau and this was devoted to reaching the cairn on Mt. Kineti, 10,414 ft.

It was first necessary to drop down into the valley and then ascend the 2000 ft. to the top. The climb was through the meadows which, where burnt, were beautiful with a dark blue and yellow Irid (*Moraea diversifolia* Baker, 89); a yellow *Hypoxis urceolata* Nel (103), and the white Larkspur (*Delphinium candidum* Hemsl., 70, 100) showed up strikingly against the charred tufts of the burnt grass. A belt of *Podocarpus* forest was crossed and here specimens of the giant *Lobelia*, bushy Groundsels, the mountain blackberry (*Rubus Steudneri* Schw., 61), the Stag's Horn Moss (*Lycopodium clavatum* L., 90), and a sedge 5 ft. high, *Cyperus derreilema* Steud. (75), were collected.

On emerging from the forest belt a dense growth of scrub, some 5 ft. high, every bush of which appeared to be armed, was encountered, and only penetrated after an exhausting fight. The thickly interlaced armed Brambles and the hooked *Dipsacus pinnatifidus* Steud. (67), and species of *Solanum* tore clothes and skin alike.

Just before the crest of the mountains was won the scrub ceased and the remainder of the ascent was made over short springy turf. The forest, which had crept up the ravines, just reached the ridge towards the top, but the trees were now kept at a height of some four feet by the strong wind sweeping over the mountains, which necessitated the wearing of all additional garments and putting down the chin strap of the helmet.

The woody species which approached nearest to the exposed top were *Hypericum lanceolatum* Lam. (82), beautiful with masses of large yellow flowers; *Anthospermum usambarense* K. Sch. (74) with an ericoid habit; *Lasiosiphon glaucus* Fres. (78), looking very much like an *Azalea*; *Brayera anthelmintica* Kth. (93); and *Tephrosia atrovioleacea* E. G. Baker (96).

The mountain top itself was covered with short grass and herbs, protected by the rocky outcrops. A collection of plants around the foot of the cairn comprised the showy white *Helichrysum argyranthum* O. Hoffm. (73) and the yellow *H. fruticosum* Vatke (77); *Asparagus asiaticus* var. *scaberulus* Engl. (62) sheltering under a rock; a stemless thistle with a dense rosette of leaves (*Carduus Theodori* R. E. Fries, 65); a yellow-flowered bushy Composite (*Coreopsis Chippii* M. B. Moss, 66); *Ramphicarpa recurva* Oliv. (68), a dwarf mauve-flowered herb a few inches high; blue-flowered Sow-thistles (*Lactuca capensis* Thunb., 69, 72), and a blue-flowered scented Mint, 18 inches high (*Micromeria biflora* Bth., 76). Nestling among the stones at the foot of the cairn, its straggling shoots rising some 6 inches high, and bearing pretty dark and light blue flowers, was *Lobelia dissecta* M. B. Moss (63). On the top of the cairn was a pole and clinging to this, exposed to all wind and weather, were tufts of lichens, *Usnea florida* Webb (64), with its variety *rubiginea* Ach. (64).

The next day in crossing the meadows of the plateau at about 9000 ft. some of the grasses and herbs were collected. They grew to a height of some three feet and at a distance the meadows resembled the moorlands of English mountain scenery.

Amongst the grasses were *Digitaria uniglumis* Stapf (97), *Setaria sphacelata* Stapf & Hubbard (98), and *Exothea abyssinica* Anderss. (99). The herbs were represented by a mauve-flowered, woolly-leaved Composite, 2 ft. high (*Athrixia rosmarinifolia* Oliv. & Hiern, 71); a purple-flowered herb *Justicia Whytei* S. Moore (79); a yellow Marigold (*Coreopsis tripartita* M. B. Moss, 80); *Hebenstreitia dentata* L. (81), whose white flowers have a pretty orange centre; and the little mauve-blue *Lactuca capensis* Thunb. (102).

Along the borders of the ravine forests was a certain amount of scrub whose plants did not penetrate the meadows individually and yet appeared to have been crowded out of the forest. There was the yellow-flowered succulent *Kalanchoe Petitiana* A. Rich. (83), 3 ft. high; a white-flowered straggling shrub, *Cyathula Schimperiana* Moq. (84); the yellow-flowered *Cineraria kilimandscharica* Engl. (86); *Hyparrhenia cymbaria* Stapf (87), which grew to a height of 7 ft., was a grass which was not found in adjacent meadows and seemed to keep to the edge of the forest. A curious succulent Labiate, growing as a bush to a height of 6 ft., and conspicuous from its dark blue calyx and flower stalks, was a species of *Coleus* (91); the heliotrope-flowered *Bothriocline Schimperii* Oliv. (92) was common; *Tephrosia atrovioacea* E. G. Baker (96) had the habit and appearance of a rose bush, and with its deep mauve flowers and black velvet pods made a striking feature of the scrub; over the bushes was a straggling *Clematis* (101) mostly with masses of feathery fruit; a pretty pale yellow-flowered climbing Pea (*Vigna Schimperii* Baker, 105) was found on a tree trunk; whilst the whorls of flaming orange flowers of *Leonotis velutina* Fenzl. (107) stood up strikingly in the tangled vegetation.



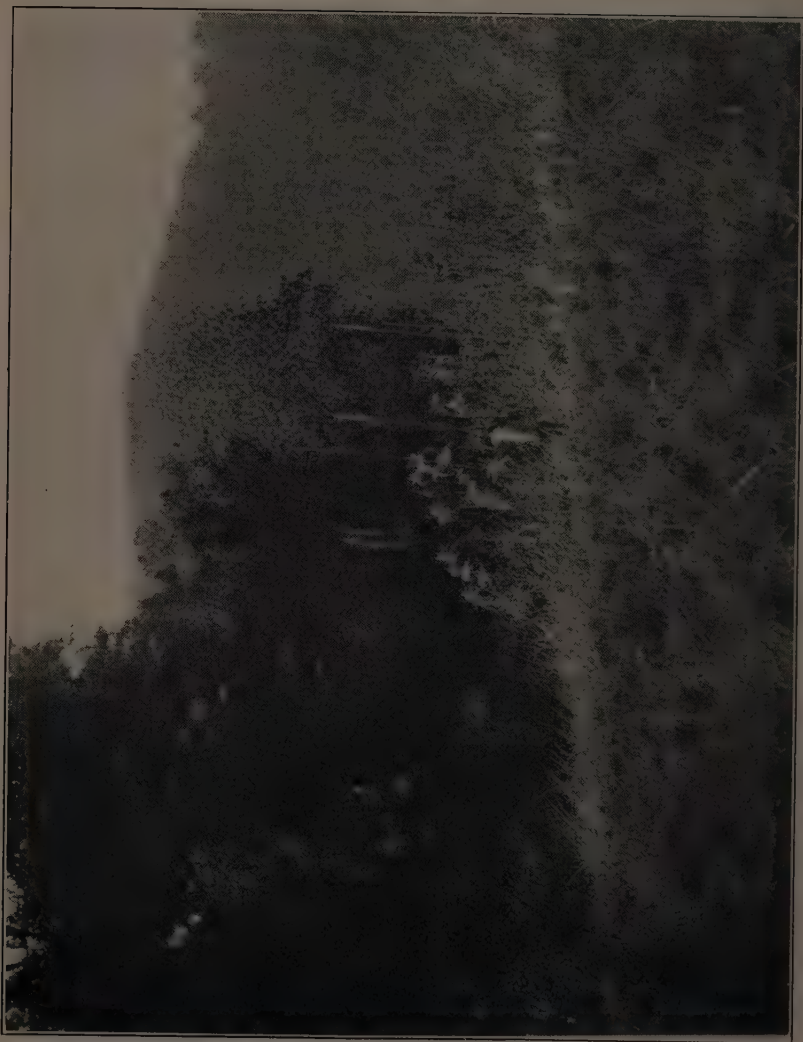
Fig. 1.



Fig. 2.

[To face page 184.]

PLATE XI



At the edge of the plateau, at about the same altitude as they were found on the other side of the plateau, about 8000 ft., were specimens of *Protea abyssinica* Willd. (108), and in a ravine nearby, standing out amongst the tree tops, but inaccessible, were the heavy candelabra-like crowns of a *Euphorbia* at least 60 ft. high, with a cylindrical stem, and ascending constricted branches 20 ft. long.

The descent was more tiring than the climb. In a distance under three miles the trail drops from the edge of the plateau at 8000 ft. to the plain 6000 ft. below. The march was exacting and the carriers laden, so that it was not found possible to make any further collection of the zones of mountain vegetation through which the trail dropped. At one part a ravine filled with *Vernonias*, 20 ft. high, a mass of mauve and white blossoms, presented a magnificent spectacle.

Logoforok, on the plain at the east side of the mountain opposite Ikoto Post, was reached that evening and the return journey to Mongalla made by motor car.

The remainder of this paper, dealing with the phyto-geographical affinities of the flora, as represented in the collection made on this tour, together with the enumeration of the specimens, and the descriptions of the new species, has been prepared by Miss M. B. Moss, of the Herbarium, Royal Botanic Gardens, Kew.

PHYTO-GEOGRAPHICAL AFFINITIES OF THE FLORA OF THE IMATONG MOUNTAINS.

In order to study the relationships of the flora of these mountains with other parts of Africa it seems preferable to consider each zone separately.

(1) The tall grass—fire-swept—woodland from 2000 ft. up to 4000 ft. contains a few trees such as *Dombeya reticulata* Mast., with a wide westerly distribution as far as Nigeria, and *Lannea Barteri* Engl., known hitherto only from Upper Guinea, whilst *Erythrina tomentosa* R. Br. and *Combretum splendens* Engl. extend in a north and south direction from the Sudan to Rhodesia. The herbaceous vegetation, however, is more widely distributed throughout Tropical Africa, some of it extending into South Africa; amongst the latter are *Crotalaria senegalensis* Bacle (to Natal), *Trichodesma physaloides* A.DC., the grass *Hyparrhenia cymbaria* Stapf (to Natal), and the cosmopolitan bracken fern, *Pteridium aquilinum* Schott. *Lissochilus mediocris* Rendle, *Ruellia sudanica* Lindau and *Clerodendron cordifolium* A. Rich. are confined to East Africa, none of them reaching further south than Tanganyika Territory.

(2) The closed equatorial forest, from 4000 to 5000 ft., contains a number of species of woody plants, some of which are apparently undescribed. A few are widely distributed throughout tropical Africa, such as *Argomuellera macrophylla* Pax (Euphorbiaceae) and

Chlorophora excelsa Bth. & Hk. f. (Moraceae). Most of the others, however, are local or with a remarkably disconnected distribution. This may be due to our lack of knowledge of the intervening regions or it may be an actual fact that they occur only in these widely separated parts. Such are *Hormogyne altissima* A. Chev.*, known from French Guinea and the Gold Coast, and *Coffea spathicalyx* K. Sch., recorded only from the Cameroons. The herbs of this area are fairly widely distributed.

(3) The fringing forest, above the closed equatorial forest, consists mainly of typically East African plants such as *Lobelia Giberroa* Hemsl., *Leonotis velutina* Fenzl., *Protea abyssinica* Willd. (also in Angola), and *Senecio multicorymbosus* Klatt, with a few widely spread species, as *Phoenix reclinata* Jacq., *Drynaria Willdenowii* T. Moore and *Dracaena fragrans* Gawl.

(4) The tall grass—fire-swept—woodland, 5000 to 8000 ft., is composed of the local *Acacia abyssinica* Hochst. and the widespread bulbous *Urginea micrantha* Solms-Laub.

(5) The mountain ravines, 8000 to 10,000 ft., contain the only gymnosperm, *Podocarpus milanjanus* Rendle, which extends southwards to Gazaland. Here, however, representatives of both the northern and southern floras meet, and it would appear probable that this flora represents the most ancient type. *Rubus Steudneri* Schweinf. occurs with the *Podocarpus* and is closely allied to the east tropical and south African *R. rigidus* Sm.; it is also found in S.W. Abyssinia and Kenya.

(6) The north and south element is also repeated in the herbaceous vegetation of the mountain meadows, *Delphinium candidum* Hemsl. being the only northern representative, whilst *Hebenstreitia dentata* L., *Moraea diversifolia* Bak., *Lactuca capensis* Thunb., *Hypoxis urceolata* Nel and *Cyrtanthus* sp. have a strong southern flavour. Of the grasses which commonly occur in these mountain meadows *Digitaria uniglumis* Stapf has been recorded from Eritrea, Abyssinia, Uganda—including Mt. Ruwenzori, Kenya, and southwards to Rhodesia. *Setaria aurea* Hochst. is common throughout Tropical Africa, and on Mt. Kilimanjaro up to 11,000 ft. *Exothea abyssinica* Anderss. occurs on the mountains from Eritrea and Abyssinia to north Nyasaland.

(7) The flora of the mountain tops, 10,000–10,414 ft., shows similar affinities, with the cosmopolitan *Asparagus asiaticus* L. and *Micromeria biflora* Bth., whilst *Hypericum lanceolatum* Lam. and *Carduus Theodori* R.E.Fries represent the northern, and *Lasiosiphon glaucus* Fres. the southern floras.

*The genus *Hormogyne* A.DC. was originally known only from Australia, and has now been reduced by Engler to a section of *Sideroxylon*. It seems very doubtful whether the African species referred to *Hormogyne* by Chevalier can be congeneric with the Australian species.

ENUMERATION OF THE SPECIMENS COLLECTED ON THE IMATONG
MOUNTAINS.

(Dicotyledons arranged according to Hutchinson's "Families of
Flowering Plants".)

The following altitudes and positions are approximately correct
for the villages and camps mentioned.

In the Acoli Hills :—

Lotti 4091 ft. $32^{\circ}32'E$, $4^{\circ}3'N$.

Payito 4600 ft. $32^{\circ}38'E$, $3^{\circ}58'N$.

Oketc (Odouro, Lomoarite) 4610 ft. $32^{\circ}40'E$, $3^{\circ}52'N$.

Issore (Onyiro) 4616 ft. $32^{\circ}50'E$, $3^{\circ}54'N$.

In the Imatong Mountains :—

Kippia 8744 ft. $32^{\circ}53'E$, $3^{\circ}58'N$.

Ras Logoforok 8000 ft. $32^{\circ}56'E$, $3^{\circ}57'N$.

The Laboni Forest is about $32^{\circ}50'E$, just north of the Uganda border,
at an approximate altitude of 4200 ft.

Fungi.

Polystictus xanthopus *Fries.* Laboni Forest.

Growing on a dead log. No. 60.

Lichens.

Parmelia perlata *Ach.* Issore.

An epiphyte in ravines. No. 58.

Usnea longissima *Ach.* and **U. florida** *Web.*, also a small
U. barbata *Wch.* Issore.

Found in the ravines leading up to the Imatong Mtns., at
5500 ft. No. 57.

Usnea florida *Web.*, including var. **rubiginea** *Ach.* Mt. Kineti,
10,414 ft.

On the pole and cairn at the top of the mountain. No. 64.

Musci.

Pilotrichella ampullacea *Broth.* Mt. Kineti, 10,000 ft.

The chief epiphyte festooning the forest trees at 8000–11,000 ft.
No. 88.

Lycopodiales.

Lycopodium clavatum *L.* Near Kippia, 9500 ft.

Growing in mountain ravines. No. 90.

Filices.

Pteridium aquilinum *Schott.* Odouro.

A ground fern in the tall grass—fire-swept—woodland, appearing
from about 5000 ft. upwards. No. 28.

Platyserium angolense *Welw.* Odouro.

An epiphyte on trees in fringing forest at 4000 ft., also occurring
on trees generally at an altitude of over 5000 ft. No. 30.

Drynaria Willdenowii T. Moore. Issore.

A trunk epiphyte in the fringing forest. No. 54.

Taxaceae.

Podocarpus milanjanus Rendle. Mt. Kineti, 10,000 ft.

The chief tree in mountain ravine forests, the bark flaking in strips, and branches festooned with mosses and lichens. Forming pure forests, or with *Lasiosiphon glaucus* Fres. and *Hypericum lanceolatum* Lam. Trees 60 ft. or more with straight bole 30-40 ft., at an altitude of 8000-10,400 ft. No. 85.

Ras Logoforok. Young fruit green with scarlet aril, drying plum coloured with the aril shrivelling and turning black. No. 104.

Anonaceae.

Monodora angolensis Welw. Lotti.

Small tree 20 ft. high in closed fringing forest. The outer 3 petals green, brown spotted; the inner white, yellow spotted. No. 16.

Ranunculaceae.

• **Delphinium candidum** Hemsl. Mt. Kineti, 10,000 ft.

White-spurred flower with violet anthers, delightfully scented; in mountain meadows 8000-10,000 ft. No. 70.

E. of Kippia, 9000 ft. Herb 2 ft. high; only capsules and dead stems. No. 100.

Clematis sp. E. of Kippia, 9000 ft.

Straggling over bushes 20 ft. high. in forests up mountain ravines. No. 101.

Crassulaceae.

Kalanchoe Petitiana A. Rich. Mt. Kineti, 10,000 ft.

Yellow-flowered herb 3 ft. high, in forested ravines. No. 83.

Amarantaceae.

Cyathula Schimperiana Moq. Mt. Kineti, 9,000 ft.

Common white-flowered straggling shrub, 10 ft. high, in mountain forested ravines, 8000-10,000 ft. No. 84.

Thymelaeaceae.

Lasiosiphon glaucus Fres. Top of Mt. Kineti, 10,414 ft.

Yellow-flowered Azalea-like shrub, 10 ft. high at mountain top, becoming a tree 50 ft. high at 8000-9000 ft. With *Anthospermum usambarens* K. Sch. and *Hypericum lanceolatum* Lam., it forms the topmost scrub on the mountain. No. 78.

Proteaceae.

Protea abyssinica Willd. Below Ras Logoforok, 6000 ft.

Freely branching tree 30 ft. high, in ravines at 5000-8000 ft. No. 108.

Flacourtiaceae.

Caloncoba Schweinfurthii Gilg. Lotti.

Small tree 20 ft. high, with heavily orange-scented flowers 3-4 inches in diameter, at the edge of the closed fringing forest. Sepals 3, petals white, anthers yellow, young leaves only seen. No. 17.

Dovyalis macrocalyx Warb. Lotti.

Small bush 12 ft. high, with strong stout spines and flowers in axillary clusters, at the edge of the closed fringing forest. Perianth green, filaments white, anthers yellow, disc-glands red. Vernacular name: Okyro (Acoli). No. 18.

Ochnaceae.

Ouratea densiflora De Willd. & Dur. Laboni Forest.

Yellow-flowered shrub 20 ft. high, in closed forest, in association with *Coffea*. The fruit is scarlet. No. 39.

Combretaceae.

Combretum splendens Engl. Payito.

A tree 50 ft. high growing on mountain side at the edge of the fringing forest, in fire-swept grassland. No. 23.

Combretum laboniense M. B. Moss, sp. nov. (see p. 195). Near Laboni Forest.

Small tree in tall grass—fire-swept—woodland. No. 45.

Hypericaceae.

Hypericum lanceolatum Lam. Top of Mt. Kineti, 10,414 ft.

Yellow-flowered shrub 10 ft. high; the bark rugose and cracking into squares; the leaves in four series. With *Anthospermum usambarense* K. Sch. and *Lasiosiphon glaucus* Fres. it forms the top-most scrub on the mountain. At lower levels the tree reaches a height of 40 ft. in forest ravines. No. 82.

Sterculiaceae.

Dombeya reticulata Mast. Lotti.

Tree 40 ft. high, or shrub in burnt country, with masses of "cherry blossom" flowers—the young leaves only and flowers seen. It is associated with open fire-swept woodland and tall grass, from Western Mongalla and Opari to Lotti, and on the mountain sides above Lotti. No. 21.

Euphorbiaceae.

Argomuelleria macrophylla Pax. Laboni.

Shrub up to 20 ft. high in forest, associated with *Coffea*. Flowers yellow with orange centre. No. 36.

Rosaceae.

Brayera anthelmintica Kth. Kippia:

Tree 60 ft. high with scarlet petioles, common in ravines, 8000-10,000 ft. With *Lasiosiphon glaucus* Fres., *Hypericum lanceolatum* Lam. and *Podocarpus milanjanus* Rendle it forms most of the ravine forest. No. 93.

Mimosaceae.

Acacia abyssinica Hochst. Issore.

Flat-topped leguminous tree 40–50 ft. high, characteristic of the tall grass—fire-swept—woodland above 5500 ft. It is almost the only tree in the fire-swept grass area at this altitude. No. 55.

Papilionaceae.

Craibea utilis *M. B. Moss*, sp. nov. (see p. 195). Lotti.

White-flowered papilionaceous tree 60 ft. high, slightly buttressed, growing in the fringing forest with *Coffea robusta* Linden. It yields good timber for native huts. No. 12.

Erythrina tomentosa *R. Br.* Lotti.

A leafless tree with brilliant scarlet flowers, growing in tall burnt-over grass on mountain sides above Lotti. No. 22.

Crotalaria senegalensis *Bacle.* Near Laboni Forest.

A small yellow-flowered papilionaceous herb, 12 in. high, arising from a woody rootstock. The flowers appear soon after a burn in the tall grass—fire-swept—woodland. No. 33.

Tephrosia atrovioacea *E. G. Baker.* Above Kippia, 9000 ft.

A papilionaceous shrub 6 ft. high, growing in scrub on mountain ravines, 9000–10,000 ft. The flowers are deep mauve, the pods black velvet. No. 96.

Vigna Schimperii *Baker.* Ras Logoforok.

Pale yellow-flowered climbing Pea, from the edge of the forests. No. 105.

Moraceae.

Chlorophora excelsa *Benth. & Hook. f.* Lotti.

Tall predominant tree in the closed forest. Nos. 19, 20.

Meliaceae.

Entandrophragma macrophyllum *A. Chev.* Lotti.

Tall tree 100 ft. high with finely lined bark, and the bottom of the bole fluted and slightly buttressed; growing in the closed fringing forest. No. 15.

Khaya grandifoliola *C. DC.* Payito.

A tall tree in the fringing forest. No. 24.

Anacardiaceae.

Lannea Barteri *Engl.* Payito.

Tall tree in tall grass-woodland over the mountain side, common in fire-swept country. The bark is spirally striate, and the flowers strongly syringa-scented. No. 25.

Sapotaceae.

Hormogyne altissima *A. Chev.* Laboni Forest.

Growing in the closed forest in association with *Coffea robusta* Linden. No. 37.

Loganiaceae.

Nuxia sambesina *Gilg.* Above Kippia, 9000 ft.

A tree 40 ft. high, forming one of the commonest components of the forests in the high mountain ravines, 8000–10,400 ft. No. 95.

Rubiaceae.

Coffea robusta *Linden.* Lotti.

Tree 20 ft. high in the equatorial type of fringing forest at the foot of the hills. Vernacular Name: Boon (Acoli). Wild Coffee. Nos. 10, 11. Laboni Forest, No. 40.

Coffea spathicalyx *K. Sch.* Lotti.

A small white-flowered tree, unknown to the natives; growing in the forest in association with *Coffea robusta* Linden. No. 13.

Belonophora glomerata *M. B. Moss*, sp. nov. (see p. 195). Lotti.

A small tree 30 ft. high, with white flowers, growing in the fringing forest in association with *Coffea robusta* Linden. No. 14.

Anthospermum usambarense *K. Sch.* Top of Mt. Kineti. 10,414 ft.

A bush 5 ft. high, forming with *Helichrysum fruticosum* Vatke and *Lasiosiphon glaucus* Fres. the highest scrub on the mountain top. It is only seen from 10,000 ft. to 10,400 ft. No. 74.

Dipsacaceae.

Dipsacus pinnatifidus *Steud.* Top of Mt. Kineti, 10,414 ft.

A scabious-like white-flowered prickly herb 6 ft. high, in scrub on the mountain top and in the forest ravines. No. 67.

Compositae.

Bothriocline Schimperi *Oliv.* var. *Kippia*.

Heliotrope-flowered Composite 6 ft. high, common in mountain ravines. No. 92.

Athrixia rosmarinifolia *Oliv. & Hiern.* Mt. Kineti, 10,000 ft.

Mauve-flowered Composite 1-2 ft. high, with woolly leaves; growing in mountain meadows. No. 71.

Helichrysum argyranthum *O. Hoffm.* Top of Mt. Kineti, 10,414 ft.

"Everlasting," 3 ft. high; the flowers are white with yellow centre, and the plant is common all over the mountain meadows at an altitude of 9000-10,000 ft. No. 73.

Helichrysum fruticosum *Vatke.* Top of Mt. Kineti, 10,414 ft.

Yellow-flowered Composite with white woolly leaves growing in scrub on the mountain top. No. 77.

Coreopsis Chippii *M. B. Moss*, sp. nov. (see p. 196). Top of Mt. Kineti, 10,414 ft.

A yellow-flowered Composite, 3 ft. high, in scrub on the mountain top. It also occurs in forested mountain ravines at an altitude of 8000-10,000 ft. No. 66.

Coreopsis tripartita *M. B. Moss*, sp. nov. (see p. 196). Mt. Kineti, 10,000 ft.

A yellow marigold, growing in mountain meadows at 8000-10,000 ft. No. 80.

Senecio multicorymbosus *Klatt.* Near Issore.

A yellow-flowered Composite shrub 20 ft. high, with the habit of a *Pandanus*, growing in the fringing forest. No. 52.

Cineraria kilimandscharica Engl. Kippia.

Yellow-flowered composite 3 ft. high, common in ravines at 5000-10,000 ft. No. 86.

Carduus Theodori R. E. Fries. Top of Mt. Kineti, 10,414 ft.

A stemless thistle with purple flowers, common on the mountain top. No. 65.

Sonchus Elliotianus Hiern. Near Laboni Forest.

A pretty little Composite 6 in. high, with dark orange ray and yellow disc, growing from a woody rootstock. Flowering occurs shortly after a burn in tall grass—fire-swept—woodland. No. 35.

Lactuca capensis Thunb. Mt. Kineti, 10,414 ft.

A blue-flowered herb 2 ft. high, in scrub on the mountain top, and in forested ravines at 8000-10,000 ft. Nos. 69, 72.

Ras Logoforok.

A pretty little mauve-blue Composite, 18 in. high; appearing in mountain meadows shortly after burning. No. 102.

Lobeliaceae.

Lobelia Giberroa Hemsl. Issore.

A plant 18 ft. high with hollow cane-like stem 2 in. in diameter near the base, very brittle and laticiferous. The flower spike is 5½ ft. long, and the biggest leaves 2 ft. long and 8 in. broad. Growing in sheltered ravines. No. 56.

Lobelia dissecta M. B. Moss, sp. nov. (see p. 197). Top of Mt. Kineti, 10,414 ft.

A pretty plant 6 in. high, with dark and pale blue flowers. It is the highest phanerogam in the Sudan, growing against the cairn on the top of Mt. Kineti. No. 63.

Boraginaceae.

Trichodesma physaloides A.DC. Near Laboni Forest.

A herb 2 ft. high growing from a woody rootstock. The petals are white, brown-streaked towards the base, and the anthers white. It appears shortly after a burn in tall grass—fire-swept—woodland. No. 34.

Scrophulariaceae.

Rhamphicarpa recurva Oliv. Mt. Kineti, 10,414 ft.

A mauve-flowered herb a few inches high, growing on the mountain top. No. 68.

Hebenstreitia dentata L. Mt. Kineti, 10,000 ft.

A herb 18 in. high, the flower white with orange centre, growing in mountain meadows at 8000-10,000 ft. No. 81.

Bignoniaceae.

Kigelia aethiopica Decne. Laboni Forest.

A shrub or tree 30 ft. high with dark orange flower, growing in the closed forest in association with *Coffea robusta* Linden. No. 44.

Acanthaceae.

Ruellia sudanica Lindau. Near Laboni Forest.

A musk-like woody herb 8 in. high growing from a woody rootstock. The flower is mauve-blue, the corolla falling early. The plant appears shortly after a burn in tall grass—fire-swept—woodland. No. 32.

Peristrophe usta *C.B.Cl.* Near Laboni Forest.

A small mauve-flowered herb growing from a woody rootstock, appearing shortly after a burn in tall grass—fire-swept—woodland. No. 41.

Whitfieldia longifolia *T. And.* Laboni Forest.

A white-flowered shrub 20 ft. high, in closed forest in association with *Coffea robusta* Linden. No. 42.

Lankesteria elegans *T. And.* Laboni Forest.

Bright orange-flowered shrub 10 ft. high, in closed forest in association with *Coffea robusta* Linden. No. 43.

Justicia Whytei *S. Moore.* Mt. Kineti, 10,000 ft.

Purple-flowered herb in mountain meadows at 8000–10,000 ft. No. 79.

Verbenaceae.

Clerodendron cordifolium *A. Rich.* Odouro.

A shrub 2 ft. high with claret-coloured calyx, white corolla with scarlet base, and green shining fruit, in tall grass—fire-swept—woodland. Nos. 48, 49.

Labiatae.

Scutellaria paucifolia *Baker.* Near Laboni Forest.

A purple-flowered herb growing from a woody rootstock and appearing shortly after a burn in the tall grass—fire-swept—woodland. No. 38.

Micromeria biflora *Benth.* Mt. Kineti, 10,414 ft.

A blue-flowered scented mint, 18 in. high, on the mountain top. No. 76.

Coleus sp. Mt. Kineti, 9000 ft.

A succulent bush 6 ft. high, the calyx and flower stalk dark blue, in mountain ravines. No. 91.

Leonotis velutina *Fenzl.* Ras Logoforok.

A handsome orange-flowered herb 5 ft. high, in ravines on the east of the Imatong Mtns. at 5000–8000 ft. No. 107.

Liliaceae.

Dracaena fragrans *Gawl.* Issore.

A tree 50 ft. high, in the fringing forest and frequent in ravines. The inflorescence stalk is 3 ft. 6 in. long, the leaves 3 ft. long and 6 in. broad. No. 53.

Urginea micrantha *Solms-Laub.* Issore.

A bulbous plant with the scape and the outside of the perianth dark claret-coloured. It appears soon after a burn on rocky ground in tall grass—fire-swept—woodland. No. 59.

Asparagus asiaticus var. **scaberulus** *Engl.* Top of Mt. Kineti, 10,414 ft.

A dwarf plant sheltering under rocks. No. 62.

Amaryllidaceae.

Hypoxis urceolata *Nel.* Ras Logoforok.

A bulbous herb 18 in. high, the bulb yellow when freshly cut. The perianth is greenish outside, the inside is buttercup yellow, as are also the anthers and stigma. It appears in the mountain meadows shortly after burning. No. 103.

Cyrtanthus sp. (§**Gastronema**). Ras Logoforok.

A salmon-pink Amaryllid, 6 in. high, with white bulb and no leaves, growing in mountain meadows. The perianth is white-edged, the bracts mauve. *Mrs. Hamilton Lee* 106.

Iridaceae.

Moraea diversifolia *Baker.* Kippia.

A herb up to 1 ft. high with the bulb several inches deep. The perianth is purple-lilac to pale blue with bright yellow triangular markings. Grows in fire-swept mountain meadows. No. 89.

Orchidaceae.

Lissochilus mediocris *Rendle.* Laboni Forest.

A leafless ground orchid, 20 in. high among 12 ft. tall grasses. The lip is dark purple, the 3 upper perianth lobes violet. No. 31.

Palmeae.

Phoenix reclinata *Jacq.* Near Laboni Forest.

Palm 50 ft. tall growing in ravines in the fringing forest. No. 50.

Cyperaceae.

Cyperus derreilema *Steud.* Mt. Kineti, 10,414 ft.

Cyperaceous plant 5 ft. high, in mountain forest ravines and in scrub at 5000–10,400 ft. No. 75.

Gramineae.

Hyparrhenia cymbaria *Stapf.* Oketc.

A grass 12–15 ft. high, one of the common ones found in the tall grass—fire-swept—woodland in Eastern Mongalla. No. 27.

Pennisetum purpureum *Schum.* Odouro.

Grass 12 ft. high, one of the common constituents of the tall grass—fire-swept—woodland. No. 29.

Oxytenanthera abyssinica *Munro.* Near Laboni Forest.

Bamboo 20 ft. high, clumps covering thousands of acres in fire-swept country. No. 51.

Hyparrhenia cymbaria *Stapf.* Kippia.

Grass up to 7 ft. high, growing on the edge of ravines but not in the meadows, up to an altitude of 10,000 ft. No. 87.

Arundinaria sp. near **A. alpina** *K. Schum.* Kippia.

Bamboo with brown stem, in ravines with *Cineraria kilimandscharica* Engl. and *Brayera anthelmintica* Kth. at an altitude of 8000–10,000 ft. No. 94.

Digitaria uniglumis *Stapf.* E. of Kippia, 9000 ft.

A grass 2 ft. high, one of the commonest constituents of the mountain meadows. No. 97.

Setaria sphacelata Stapf & Hubbard. E. of Kippia, 9000 ft.

A grass 3 ft. high, one of the commonest constituents of the mountain meadows. No. 98.

Exothea abyssinica Anderss. E. of Kippia. 9,000 ft.

A grass 2 ft. high, forming a common constituent of the mountain meadows. No. 99.

NEW SPECIES FROM THE IMATONG MOUNTAINS.

Combretum laboniense M. B. Moss, sp. nov. ; affinis *C. hypopilino* Diels, sed indumento longiore, filamentis longe exsertis valde distincta.

Arbor minor, ramulis junioribus molliter pubescentibus. *Folia* elliptica, apice acuminata, basi rotundata vel late cuneata, circiter 9 cm. longa et 4 cm. lata, utrinque tomentosa, supra demum glabrescentia, nervis lateralibus utrinsecus circiter 8 ; petioli 1-1.5 cm. longi, pubescentes. *Inflorescentia* axillaris, racemosa, pluriflora, usque ad 7 cm. longa, pubescens ; flores sessiles ; calyx campanulatus, 4-lobatus et 4-angulatus, 5 mm. longus ; petala 4, late obovata, apice emarginata, basi breviter unguiculata, 2.5 mm. longa et lata, glabra ; stamina 8, longe exserta ; antherae subglobosae, 1 mm. longae, filamentis 1.2 cm. longis glabris ; stylus cylindricus, 6 mm. longus, glaber, stigmate truncato ; discus cupuliformis, ad marginem dense villosus ; ovarium tomentosum.

SOUTHERN SUDAN : near Laboni Forest, Imatong Mtns., 1300 m. in tall grass—fire-swept—woodland, Feb., Chipp 45 (type).

Craibea utilis M. B. Moss, sp. nov. ; affinis *C. atlanticae* Dunn, sed foliis et inflorescentiis majoribus, pedicellis brevioribus differt.

Arbor 20 m. alta, ramulis longitudinaliter striatis glabris vel infra stipulas pilis nigris parce indutis ; gemmae subglobosae, induratae. *Stipulae* mox deciduae. *Folia* 3-vel 5-foliolata, circiter 26 cm. longa ; rhachis glaber, ad basin rugosus ; foliola alterna, ovato-oblonga, apice obtusa, sensim acuminata, basi late cuneata, 10-14 cm. longa, 5-6 cm. lata, chartacea, glabra, utrinque crebre reticulata, nervis lateralibus utrinsecus circiter 7 arcuatis infra prominentibus ; petioli 5-6 mm. longi, rugosi. *Inflorescentia* paniculata, terminalis, dense brunneo-tomentosa ; pedicelli 3 mm. longi ; calyx 5 mm. longus, lobis late triangularibus alte connatis ; corolla alba ; vexillum late ellipticum, apice emarginatum, viridiotatum ; alae oblongae, unguiculatae, basi in latere superiore sagittatae, liberae ; carina alis similis ; stamina 10, diadelpha ; antherae subglobosae, dorsifixae ; filamenta inaequilonga, glabra ; ovarium glabrum, sessile ; stylus inflexus, stigmate parvo capitato.

SOUTHERN SUDAN : Lotti, Imatong Mtns., 1300 m., associated with *Coffea robusta* Linden, Feb., Chipp 12 (type).

Belonophora glomerata M. B. Moss, sp. nov. ; affinis *B. coffeoidi* Hook. f., sed bracteis brevioribus, foliorum nervis lateralibus paucioribus differt.

Frutex circiter 7 m. altus; ramuli annotini lignosi, cinerei, hornotini glabri, nigri, internodiis elongatis. *Stipulae* lanceolatae, acutae, 1.2 cm. longae, demum induratae. *Folia* usque ad 1.5 cm. longe petiolata, oblanceolato-obovata vel elliptico-obovata, firmiter chartacea viridescencia vel leviter brunnescentia, concoloria, basi angustata, abrupte et longe acuminata, glabra, usque ad 21 cm. longa et 10 cm. lata, nervis lateralibus utrinsecus 6 infra prominentibus. *Flores* in axillis foliorum glomerati, subsessiles vel breviter pedicellati; alabastra elongata, minute pubescentia, sub anthesin 8 mm. longa; calycis lobi ovati, ciliati, 1.5 mm. longi, dextrorsim contorti; calycis tubus 1.5 mm. longus, pubescens; corollae tubus 1.2 cm. longus, anguste cylindricus, superne pubescens, intus glaber; lobi 5, anguste elliptici, dextrorsim contorti; antherae longe ellipticae, inclusae, filamentis brevissimis; stylus crassus, brevis; stigma subcylindricum, apice 2-lobum; ovarium subglobosum, pubescens, 2-loculare.

SOUTHERN SUDAN: Laboni Forest, Imatong Mtns., 1300 m., associated with *Coffea robusta* Linden, Feb., Chipp 46 (type); Lotti, 1300 m., Feb., Chipp 14.

UGANDA: Mawokota, Feb., E. Brown 159.

Coreopsis Chippii M. B. Moss, sp. nov.; affinis *C. macranthae* Sch. Bip., sed foliis et capitulis minoribus, achaeniis truncatis nudis differt.

Suffrutex 1 m. altus, ramulis puberulis et nodis prominentibus. *Folia* opposita, ad basin connata, valde dissecta, circiter 2 cm. longa, segmentis linearibus glabris vel glabriusculis. *Capitula* subcorymbosa, subglobosa, 1 cm. diametro, flava, pedunculo 1.2 cm. longo dense puberulo; involucrum duplex, bracteis liberis exterioribus angustis herbaceis saepe patentibus, interioribus ad marginem membranaceis majoribus striatis; paleae concavae, membranaceae, flores disci subtendentes; flores radii 1-seriati, neutri, ligulis 3-dentatis 1 cm. longis; flores disci apice breviter 5-fidi; antherae basi minute 2-dentatae, apice breviter productae; styli rami truncati, minute appendiculati. *Achaenia* a dorso compressa, anguste obovato-oblonga, 4 mm. longa, apice truncata.

SOUTHERN SUDAN: top of Mt. Kineti, 3470 m., Feb., Chipp 66 (type).

Coreopsis tripartita M. B. Moss, sp. nov.; affinis *C. abyssinicae* Sch. Bip., sed foliis semper tripartitis, capitulis minoribus, achaeniis haud aristatis differt.

Herba erecta, ramulis glabris vel minute puberulis longitudinaliter striatis. *Folia* opposita, basi connata, tripartita, apice breviter mucronata, glabra, circiter 2 cm. longa. *Capitula* solitaria, terminalia, flava, pedunculo usque ad 6 cm. longo puberulo; involucri bractae 2-seriatae, parce tomentosae, exteriores herbaceae, oblongae, patentes, interiores submembranaceae, erectae; paleae concavae, membranaceae; flores radii ligulati, neutri, obovato-

elongati, apice 3-dentati, 1.2 cm. longi; flores disci 4 mm. longi, apice 5-dentati; antherae basi minute 2-dentatae, apice breviter appendiculatae; styli rami mucronati. *Achaenia* dorso compressa, apice truncata.

SOUTHERN SUDAN: Mt. Kineti, 3470 m., Feb., Chipp 80 (type).

Lobelia dissecta M. B. Moss, sp. nov.; inter species africanas foliis dissectis ovario superiore satis distincta.

Herba usque ad 16 cm. alta, ramulis purpureis e basi abeuntibus glabris. *Folia* palmata, sessilia, lobis linearibus multis, usque ad 1 cm. longa, glabra. *Flores* caerulei, terminales vel 1-2 in axillis superioribus foliorum, pedicellis 5 mm. longis fructu multo longioribus; calycis lobi 5, liberi, lineares, acuti, 4 mm. longi, glabri; corolla 8 mm. longa, lobis 3 anterioribus oblongis alte connatis, 2 posterioribus anguste acuminatis ad basin divis; antherae filamentaque superne connata, 2 posteriores majores, 3 anteriores apice ciliatae; ovarium superius, stylo cylindrico 3 mm. longo, stigmatibus capitato. *Capsula* 5 mm. longa.

SOUTHERN SUDAN: top of Mt. Kineti, 3470 m., Feb., Chipp 63 (type).

EXPLANATION OF PLATES.

PLATE VIII. *Oxytenanthera abyssinica* forest in the Acoli Hills. (p. 180).

PLATE IX. Fig. 1. View from Lotti Rest House, Acoli Hills (4500 ft.). A belt of Closed Forest (*Khaya*, *Entandrophragma*, *Alstonia*, etc.) in the tall grass—fire-swept—woodland (*Erythrina*, *Dombeya*, *Combretum*, *Pennisetum*, *Hypparrhenia*, etc.) (p. 181).
Fig. 2. Mountain meadow near Kippia (9000 ft.), Imatong Mountains. (Trees *Nuxia zambesina*, herbs *Delphinium*, *Digitaria*, *Setaria*, *Exothea*, etc.) (p. 181).

PLATE X. Fig. 1. View from the neck of Mt. Kineti (10,000 ft.) looking southwards, showing the limit to which the *Podocarpus* forest ascends. Shrub growth of *Hypericum*, *Anthospermum*, *Lasiosiphon*, etc. (p. 184).

Fig. 2. The cairn on the top of Mt. Kineti (10,414 ft.). At the foot of the cairn *Lobelia dissecta*, *Carduus Theodori*, *Micromeria biflora*, etc. On the pole, tufts of *Usnea*. (p. 184).

PLATE XI. Near Ras Logoforok (8000 ft.) The edge of the *Podocarpus* forest with *Hypericum* and *Lasiosiphon*: *Lobelia Gibberoa* in centre: amongst the burnt grass in the meadow in foreground *Hypoxis*, *Moraea*, etc. (p. 185).

XXX.—RESEARCHES ON *SILENE MARITIMA* AND *S. VULGARIS**: IV. CYTOLOGICAL OBSERVATIONS. R. O. WHYTE.

INTRODUCTION.

Material was collected at Potterne from certain plants of *Silene maritima* and *S. vulgaris*, in order that a study of the cytological behaviour of the plants might be made. There are actually two

*Continued from K.B. 1929, p. 175.

main problems attached to the work, firstly, the effect of hybridization between the two species, and secondly, the study of sex in *Silene maritima*. It might be supposed that these two problems could be worked at separately, without fear of confusion, but such is not the case. The study of the sex problem having assumed greater importance from a cytological point of view, and being rather easier to approach, this aspect will be dealt with first.

SEX IN *SILENE MARITIMA*.

The influence of a time factor has already been shown to play a large part in the various sex forms of *Ranunculus acris* (Whyte 1929). In this species there were shown to be two definite phases in the development of the sporogenous tissues of a flower, namely a male or anther phase, and a female or ovule phase, and that in a normal hermaphrodite flower these two phases are distinctly successive, with little or no overlap. In certain plants, the respective periods of activity have come to overlap to a greater or less extent, with a failure in the anthers in proportion to the amount of this overlap, thus giving rise to all intermediate forms between a normal hermaphrodite and a "female" flower. This influence is present also in *Silene maritima* (Plant A.2), causing male sterility. Although from a genetical point of view this plant is a "female" (with the exceptions noted in No. 1 of this series, Marsden-Jones & Turrill 1928), a cytological examination shows that its "femaleness" does not approach that of *R. acris* "female." Instead of the reduction periods in pollen mother cells and megaspore mother cells coinciding as in the latter example, they are separated by a considerable interval, and it is generally not until pollen tetrads have been formed in quantity that degeneration of the anther sets in. It is evident that, from a purely cytological point of view, this "female" *Silene* plant belongs to the "minus normal" or "abnormal" class, these terms being used as in the *Ranunculus* work.

If the anthers of *Silene* were arranged in a descending series as in *Ranunculus*, some good pollen would be formed in the older members, or conversely, if the anthers of *R. acris* were in one whorl, it is probable that no pollen would be formed in the "minus normal" and "abnormal" plants of that species, and that these two classes would come under the head of *R. acris* "female." It is conceivable also that the genetic behaviour of the cross *S. maritima* "normal" by *S. maritima* "female" would show some relation to that found in the cross *R. acris* "normal" by *R. acris* "abnormal" or "minus normal."

It has been found in the work on *Ranunculus acris* (Marsden-Jones & Turrill mss.) that the classes "minus normal," "abnormal," etc., are purely arbitrary, it being very difficult to classify into definite groups owing to the presence of all gradations between hermaphrodite and "female." Although from a genetical point of view, the sex problem in *Silene* does not permit of the application of such arbitrary classes, owing largely to the development of

the anthers in one whorl, cytological examination shows the presence of a more or less complete series, comparable with that found in *Ranunculus*. The following table, which includes several types of plants found in the two species examined, has been prepared from the cytological evidence, with verification from genetical facts whenever possible.

<i>Plant.</i>	<i>Pollen Production.</i>
-----	Full pollen output.
<i>S. vulgaris</i> K. 454	Medium pollen output, with some instances of bad pollen tetrads, owing to tapetal failure.
<i>S. vulgaris</i> K. 525	
<i>S. maritima</i> A. 15.	
N5/18.	
<i>S. maritima</i> 21/2	Low to medium pollen output, bad pollen tetrads being more numerous owing to greater amount of tapetal failure.
<i>S. vulgaris</i> B. 1	
N3/3	
N4/15	
<i>S. maritima</i> A. 1	
N5/8	

Male fertility

Male sterility

S. maritima A2 "female" Tapetal failure occurs before pollen tetrads have changed to mature pollen. Pollen output nil.

The plant numbers are those used in the experimental ground at Potterne; descriptions have been given in the preceding papers of this series. Those preceded by the letter N are F₁ generation plants of hybrids between the two species. Examination of numerous flowers from each type of plant indicates that, while such a classification is quite feasible, any flower of any one type may vary considerably from its arbitrary position.

The male sterility line incorporated in the table is assumed to be the dividing line taken in field observations between hermaphrodite plants and "females." When the *Ranunculus* results are considered, it is only natural that *S. maritima* A. 2 should show a graded series of forms up to that line, with spasmodic crossings into the male fertility zone, as has been reported, and that the other *S. maritima* types should show a similar graded series down to the same line. That the position of *S. maritima* A. 1 near the fertility line is correct is verified by observations made at Potterne in the summer of 1928, when during that dry season, a number of "female" flowers appeared, indicating that circumstances had arisen to cause these plants to descend the scale into the male sterility zone. In other words, the time factor had become operative, and reduced a low pollen output to nil by reduction of the period of activity in the tapetum. The position of *S. vulgaris* on the table indicates that incipient sterility is still in an early stage, that the time interval between male and female reduction processes has deviated only very

slightly from that of a normal hermaphrodite *Silene*. Tapetal activity has not been affected by ovular development until a considerable quantity of mature pollen has been produced. It will be noted that no plant of those examined from this point of view in the genus *Silene* can be called a normal hermaphrodite, in the restricted meaning of the term.

HYBRIDS BETWEEN *S. maritima* and *S. vulgaris*.

It is evident that, with the presence of a certain amount of sterility in both parents and F₁ hybrids, the study of the effect of hybridization between these species is rendered rather complicated from a cytological point of view. The somatic chromosomes, 24 in number, are too small to give a suitable basis for comparison between the various types; any comparison, if at all possible, would be so forced as to be of little value. The chromosome complements of the plants used are perfectly compatible one with the other, indicating the close relationship of the two species, and the question of pollen fertility is completely obscured by the incipient sterility noted in the earlier parts of this paper. Cytological examination cannot, it seems, be of much assistance in the study of the effect of hybridization in these species of *Silene*.

SUMMARY.

The "time factor" which was found to explain the occurrence of various sex forms of *Ranunculus acris* (Whyte 1929) applies also to a similar question in *Silene maritima*. The overlap between the male and female phases is here not great, and pollen tetrads are formed before anther degeneration. The incipient sterility noted in the hermaphrodite plants of this species and of *S. vulgaris* is due to the effect of the time factor in a milder form.

Cytological examination of hybrid material shows complete compatibility of chromosome complements, and any sterility which may have arisen as a result of hybridisation is obscured by the other type of sterility already present, which latter has been explained by the time factor.

LITERATURE.

Marsden-Jones, E. M. & Turrill, W. B. "Researches on *Silene maritima* and *S. vulgaris*." *Kew Bulletin* 1928, No. 1.

Whyte, R. O. "Dioecism in *Ranunculus acris*." *Nature* cxxiii. 13 (1929).

XXXI.—VIOLÆ ASIATICAE NOVAE. WILHELM BECKER.

In *Kew Bulletin*, 1928, pp. 133-140, a number of new species of *Viola* from the Andes were described by the late Herr W. Becker. The following descriptions, which deal with new species from various regions in Asia, were received from Herr Becker shortly before his death.

Viola jangiensis W. Bckr., sp. nov. (§ *Nomimium* Ging.); a *V. turkestanica* Reg. et Schmalh., quae folia similia interdum praebet, rhizomate crassiore brevissime articulado foliis pubescentibus stipulis non adnatis floribus minoribus breviter calcaratis distincte diversa, et huic non affinis.

Herba acaulis circ. 8 cm. alta. *Rhizoma* verticale, 2–3 mm. crassum, breviter articulatum, in radices elongatas lignosas crassiusculas transiens. *Folia* longissime petiolata, basi plane cordata, triangularia vel late triangulari-ovata, obtusa, plane et remote crenata, partim repando-crenata, utrinque pubescentia (praecipue infra) et glabrescentia; folia adolescentia angustiora, pubescentiora. *Stipulae* non adnatae, angustae, fuscae, usque ad 1 cm. longae, remote fimbriatae. *Flores* folia non superantes, parvi, circ. 5–6 mm. longi, verisimiliter dilute violacei; pedicelli tenues, 5–7 cm. longi, in medio bracteolati, bracteolis circ. 3 mm. longis. *Sepala* ovato-lanceolata, 2 mm. longa, lateralia 3 mm. longa angustiora, breviter appendiculata. *Petala* lateralia subbarbata; calcar acutiusculum, 1 mm. longum. *Ovarium* conoideum; stylus basi subgeniculatus, subclavatus, apice non deplanatus et non curvatus, in orificium subapertum sursum directum transiens.

INDIA: Punjab, in glareosis versus pagum Jangi in ditone Kunáwar, 11,000 ft., 17th July 1885, *Nánah* in Herb. Drummond. 2003.

Viola cuspidifolia W. Bckr., sp. nov. (§ *Nomimium* Ging.); ad gregem *Adnatas* W. Bckr. pertinens, a *V. betonicifolia* Sm., *Patrinii* DC. et *mandshurica* W. Bckr. rhizomate elongato verticali verrucoso valde differt.

Herba 8–10 cm. alta, glaberrima, cano-viridis. *Rhizoma* verticale, circ. 7–8 cm. longum, non radicellatum, 3–4 mm. crassum, tuberculatum. *Stipulae* anguste lanceolatae, usque ad partem superiorem adnatae, remote brevifimbriatae, circ. 1 cm. longae. *Folia* lanceolata, in petiolum aequilongum sensim angustata, acutiuscula, remote subserrata, 3–4 longinervia, 3–4 cm. longa et usque 1 cm. lata; nervi subtus prominentes. *Flores* folia superantes, pauci, verisimiliter dilute violacei. *Sepala* ovato-lanceolata, acuminata, appendicibus subangustioribus subquadratis. *Petala* elliptica; petalum infimum spathulatum, breviter calcaratum; calcar crassiusculum, circ. 2 mm. longum. *Stylus* basi subgeniculatus, adversus apicem sensim clavatus, apice in parte aversa erecto-marginatus, in fronte suberecto-rostellatus.

CENTRAL CHINA: W. Hupeh, April 1900, *E. H. Wilson* 2683 (type in Herb. Kew., syntype in Mus. Bot. Paris.).

Viola cordifolia W. Bckr., sp. nov. (§ *Nomimium* Ging.); ad gregem *Adnatas* W. Bckr. pertinens; a *V. metajaponica* Nakai foliis late cordato-ovatis glaberrimis et calcari abbreviato distincte diversa.

Rhizoma articulatum, breve, radicellatum, estolonosum. *Folia* in statu florifero petiolis subaequilonga apicem adversus alatis glabris

vel brevissime puberulis, basi profunde cordata plus minusve late ovata, multicrenata, glabra, excisuris plane obtusis, incisuris plus minusve obtusis, apice obtusiuscula, non acuminata. *Folia* in statu fructifero longius petiolata, basi subaperte cordata plus minusve late ovata vel triangulari-ovata; petiolis adversus apicem alatis. *Stipulae* adnatae, breves, circ. 1 cm. longae, laciniis liberis distantibus. *Flores* folia non superantes; pedunculi infra medium longe bracteolati, brevissime pubescentes, glabrescentes. *Sepala* late lanceolata, acuminata, distincte appendiculata. *Petal*a superiora et lateralia obovata; petalum infimum elongato-obcordatum, apice plane emarginato, breviter calcaratum, calcari 2 mm. longo crassiusculo. *Ovarium* conoideum; stylus basi subgeniculatus, clavatus, apice deplanatus, adversus partem aversam utrinque marginatus, in fronte brevissime rostellatus. *Capsula* subconspicua, ellipsoidea.

CHINA: Yunnan, Mengtsze, 4600 feet, on bank in shade, *A. Henry* 11226 (type in Herb. Kew.); Kiangsu, Prov. Liang Shan, Nanking, along walls, Oct. 1926, *C. Y. Chiao*, herb. Univ. Nanking 13218 (herb. Bckr., stat. fruct.).

Viola triangulifolia *W. Bckr.*, sp. nov. (§ *Nomimium* Ging.); ad gregem *Bilobatas* *W. Bckr.* pertinens, *V. Raddeanae* Regel affinis, foliis triangularibus latioribus et stipulis brevibus distincte diversa.

Rhizoma crassiusculum, articulatum, obliquum, radicibus obsitum. *Caules* 1 vel nonnulli, erecti, tenues, elongati, 20–25 cm. alti, glaberrimi. *Folia* basilaria basi subcordata, late ovata, acuta, 1–1.5 cm. longa, basi 0.5–1.2 cm. lata, longe petiolata; folia caulina adversus caulis partem superiorem gradatim brevius petiolata, basi plane cordata usque truncata, ovato-triangularia usque elongato-triangularia, basi 1.5–2 cm. lata, 3–4 cm. longa, indistincte serrata, acuta. *Stipulae* vix 1 cm. longae, subintegrae, obsolete dentatae, dimidium petioli non attingentes. *Flores* parvi, 5 mm. longi, brevissime calcarati; praeterea a *V. Raddeana* non diversa.

CHINA: Kiangsi, *Hu* 816 (1921, type in Herb. Kew.); herbier de *Zi-Ka-Wei*, vers Kia-lou (Ou-yuen-hsien), bois, 30th April 1920, *R. P. Courtois* 25561 (herb. Mus. Bot. Paris.).

Viola Prattii *W. Bckr.* sp. nov. (§ *Dischidium* Ging.); ad gregem *Brevicalcaratas* *W. Bckr.* pertinens, a *V. biflora* L. foliis basi non profunde cordatis, ceterum reniformibus vel rotundatis usque ovatis, plus minusve acuminatis, conspicue repando-crenatis et caulibus inde a basi longe efoliatis diversa; a *V. Rockiana* *W. Bckr.* foliis acuminatis majoribus et caulibus altioribus validioribus differt.—*Syn. V. szetschwanensis* *W. Bckr.* et *De Boiss.* var. *nudicaulis* *W. Bckr.* in *Beih. Bot. Ctrbl.* xxxiv. (1916) Abt. ii. p. 262.

Herba circ. 12 cm. alta. *Rhizoma* crassiusculum, plus minusve horizontale, articulatum, radicellatum. *Caules* 1–2, glabri, inde a basi longe nudi, solum in parte suprema foliati. *Folia* basilaria 1–2, longe petiolata, folia caulina plus minusve conferta, breviter

petiolata, subpubescentia et glabrescentia, basi plus minusve plane cordata, reniformia usque ovata, distincte acuminata, circ. 2-2.5 cm. lata et longa conspicue repando-crenata, crenis utrinque circ. 7-10. *Stipulae* late ovatae, acuminatae, subintegrae, 5 mm. longae. *Flores* plerumque 2, flavi, usque 1.5 cm. lati; pedicelli folia superantes, in medio bracteolis minutis praediti. *Sepala* anguste linearia, circ. 5 mm. longa, brevissime appendiculata. *Petala* obovata; calcar breve, 1 mm. longum, tenue, acutiusculum, subrecurvatum.

WEST SZECHUEN and TIBETAN FRONTIER: chiefly near Tachienlu, at 9000-13,500 feet, *A. E. Pratt* 864 (type in Herb. Kew.). WESTERN CHINA, shady places, 11,000-12,000 feet, July 1903, *E. H. Wilson* 3221.

XXXII.—SPHAERALCEA CREEANA. T. A. SPRAGUE AND N. Y. SANDWICH.

The subject of the present note was first noticed in cultivation in several English nurseries in the year 1837, and was described and figured in 1838 as a new species, *Malva Creeana* Graham (Bot. Mag. t. 3698). A second illustration, also coloured, was given in Paxton's Magazine of Botany, vol. vi. facing p. 55 (1839). The plant described by Graham was received at the Edinburgh Botanic Garden in 1837, from Mr. Prince, a nurseryman of Exeter, but nothing was known of its previous history or native country. Paxton was equally in the dark as to the origin of *Malva Creeana*. The description was reproduced in Walp. Rep. i. 293 (1842). No further reference to the species has been traced until 1849, when Asa Gray (Mem. Amer. Acad. n.s. iv. 21) reduced it with a query to *Malvastrum grossulariaefolium* A. Gray (*Sida grossulariaefolia* Hook. et Arn.). The latter was based on a plant collected in the Snake Country (North-west America) by Dr. Tolmie. In 1878 Sereno Watson (Bibliogr. Ind. Am. Bot. 138) cited *Malva Creeana* as a synonym of *Malvastrum coccineum* var. *grossulariaefolium* (Hook. et Arn.) Torr. Asa Gray in 1887 (Proc. Am. Acad. xxii. 291), transferred *Malvastrum grossulariaefolium* to the genus *Sphaeralcea*, as *Sphaeralcea pedata* Torr., and observed that "*Malva Creeana* Graham in Bot. Mag. t. 3698, probably came from this, perhaps is a hybrid." In his posthumous Synoptical Flora of North America vol. i. part 1, p. 314 (1897) it is stated that "*Malva Creeana* Graham Bot. Mag. t. 3698, if N. American, probably came from *Sphaeralcea pedata*, perhaps through hybridization with something else." Rydberg, who published the new combination *Sphaeralcea grossulariaefolia* (Hook. et Arn.), also cited *Malva Creeana* as a doubtful synonym.

Malva Creeana was in cultivation in the Botanic Garden, Zürich, in 1852, in which year a short description and coloured figure of a hybrid between it and *Malva miniata* (*Sphaeralcea miniata*) were published in Regel, Gartenflora, i. 163, t. 16.

In the autumn of 1928, a plant of a *Sphaeralcea*, stated to have come from California, came into flower in one of the greenhouses at

Kew, and was identified with *Malva Creeana* Graham. About the same time specimens of this species were received for identification from private correspondents. For it, the new combination *Sphaeralcea Creeana* (Graham) is now proposed. *S. Creeana* certainly seems to be related to *S. grossulariaefolia*, but differs from that species in the much more dissected leaves, and the larger calyx with longer and proportionately narrower lobes. We are therefore unable to follow Asa Gray, Sereno Watson and Rydberg, who tentatively united the two species. It may be pointed out that even if *Malva Creeana*, *Sida grossulariaefolia* and *Sphaeralcea pedata* are treated as conspecific, the combined species will bear the name *Sphaeralcea Creeana*, since the oldest specific epithet is *Creeana* (1838), *grossulariaefolia* dating from 1840, and *pedata* from 1887.

It is perhaps questionable whether the genera *Sphaeralcea* St. Hil. and *Malvastrum* A. Gray are really separable. This is hinted in the Synoptical Flora, and *Malvastrum* has been definitely reduced to *Sphaeralcea* by Rydberg (Bull. Torr. Club, xl. 58: 1913). Typical species of *Sphaeralcea* have 1-3 ovules in each loculus, and the loculus in a fruiting stage is more or less extended and empty above, whereas in *Malvastrum* the ovules are solitary and the seed conforms to the outline of the loculus (*vide* Sprague and Gray, Ill. Gen. N. Am. ii. 59, tt. 121, 122; 69, t. 127.) The distinction is, however, not a very sharp one. The status of *Sphaeralcea Creeana*, whether wild species or hybrid, remains doubtful. On the one hand the various species of *Sphaeralcea* hybridize readily, but on the other, no definite evidence appears to have been brought forward in support of a hybrid origin of *S. Creeana*. It seems quite possible that the plant may still be found in an indigenous condition in some parts of California, or even that it may have been collected, and assigned erroneously in herbaria to some other species. The Kew plant has not hitherto produced seed, a circumstance which added to the difficulty of determination, since the small section to which it belongs consists of "species of difficult discrimination, at least without mature fruit" (Syn. Fl. i. part 1, p. 314).

***Sphaeralcea Creeana* (Graham) Sprague et Sandwith**, comb. nov. *Malva Creeana* Graham in Bot. Mag. t. 3698 (1838); Paxt. Mag. Bot. vi. 55, cum tab. col.—Origin doubtful, possibly a hybrid, possibly a native of California.

XXXIII. — CONTRIBUTIONS TO THE FLORA OF BURMA: VII.* C. E. C. FISCHER.

***Fibraurea chloroleuca* Miers** [Menispermaceae].

Known from Indo-China and the Malay Peninsula and Archipelago.

Ngawun Reserve, Mergui, Feb., R. N. Parker 2592. "Flowers green."

*Continued from K.B. 1928, p. 336.

***Garcinia rostrata* Hassk.** [Guttiferae].

Known from the Malay Peninsula.

Nattalei Reserve, Mergui, 500 ft., March, *Sukoe* per C. E. Parkinson 7728. "Flowers yellowish."

***Ancistrocladus pinangianus* Wall.** [Ancistrocladaceae].

Known from the Malay Peninsula.

Yaungwak klong, Mergui, Feb., R. N. Parker 2723.

***Elaeocarpus tectoniaefolius* Ridl.** [Tiliaceae].

Known only from Siam.

Maran, Maliwun, Mergui, 100 ft., April, *Sukoe* per C. E. Parkinson 7748. "Tree, flowers white, scented. Stem terete, grey."

***Aspidopteris floribunda* Hutch.** [Malpighiaceae].

Known from Assam and China.

Bausanpan, Maliwun, Mergui, 300 ft., April, *Sukoe* per C. E. Parkinson 7755. "Woody climber; flowers white; branchlets deciduous in the hot season."

***Tetrastigma subsuberosum* Planch.** [Ampelidaceae].

Known from Indo-China.

Pawut, Mergui, Jan., R. N. Parker 2515.

***Gluta coarctata* Hook. f.** [Anacardiaceae].

Known from Siam and the Malay Peninsula and Archipelago.

Melechan, Maliwun, Mergui, at sea-level, flowers Dec., fruit April, *Sukoe* per C. E. Parkinson 6263, 7764. Siamese name *Maik rak* or *Mai rak*. "Middle-sized tree in thickets on banks of streams; stem grey, sending out aerial roots; flowers white to pink or brownish red."

***Castanola Wallichii* Schellenb.** (*Agelaea Wallichii* Hook. f.) [Connaraceae].

Known from the Malay Peninsula.

Zimba Valley, Tavoy, Nov., R. N. Parker 2264, "Large climber in evergreen forest."

***Eriobotrya Wardii* C. E. C. Fischer** [Rosaceae]; affinis *E. elliptica* Wall., foliis sessilibus obtusis nervis paucioribus praeditis, inflorescentia omnino glabra, lobis calycinis semicircularibus differt.

A spreading, deciduous tree up to 30 ft. high; twigs thick, dark-grey, glabrous, furrowed when dry. Leaves coriaceous, aggregated at the ends of the branchlets, sessile, quite glabrous, obovate, obtuse, narrowed to the base, 16-30 cm. long, 8-15 cm. wide, when dry brown or olive-green above, glaucescent below, midrib and 11-13 primary nerves impressed above, prominent below, secondary nerves subregular and almost straight between the primary. *Stipules* deciduous (not seen). *Corymbs* terminal, dense; peduncle and its branches stout, glabrous, nearly black when dry; bracts caducous, lanceolate, 7-10 mm. long, margins scarious, glabrous

without, densely white-villous within. *Flowers* numerous, 2-2.3 cm. diam., quite glabrous, "with a powerful fragrance of meadow-sweet." *Pedicels* 5-6 mm. long, rather stout. *Calyx* turbinate, 7 mm. long, lobes 5, semicircular, wider than long, a little shorter than the tube, *Petals* 5, imbricate in bud, suborbicular with a very short, broad claw, 8-10 mm. long, cream-coloured. *Stamens* numerous; filaments flattened, slightly widened at the base, a little longer than the petals; anthers small. *Disc* smooth. *Ovary* 3-5-celled; styles 3-5, shortly connate at the base, shorter than the stamens; stigmas capitate, slightly lobed; ovules 2 in each cell. *Fruit* (not seen) "indehiscent, as large as walnuts."

Namkiu Mountains. Valley of the Sheinghku, 6000-7000 ft., in flower in Oct., *F. Kingdon Ward* 7618 (type, in Herb. Kew.); Sheinghku Wang, 7000 ft., fruiting in May, *F. Kingdon Ward* 6743.

***Rhodomyrtus tomentosa* Wight** [Myrtaceae].

Known from South India, China, Siam and the Malay Peninsula and Archipelago.

Bokpyin, Mergui, at sea-level, Feb., *Sukoe per C. E. Parkinson* 7647.

***Alangium Kurzii* Craib** [Cornaceae].

Known from Siam.

Maliwun, Victoria Point, 100 ft., flowers March, *C. E. Parkinson* 2029. "Tree 70 ft. high; flowers pale-yellow."

***Hydnophytum formicarium* Jack** [Rubiaceae].

Known from the S. Andaman Islands, Indo-China and the Malay Peninsula and Archipelago.

Lenya Valley, Mergui, flowers Feb., *R. N. Parker* 2705. "Epiphyte; roots swollen, 20 cm. thick, full of galleries occupied by ants. Common on trees near swamps and pools."

***Justicia alternifolia* C. B. Clarke** (Acanthaceae).

Known from the Malay Peninsula.

Ngawun Reserve, Mergui, Feb., *R. N. Parker* 2620. "Shrub 4 ft. high. Flowers small, white. Common and gregarious in moist shady places."

***Phacellaria malayana* Ridl.** [Santalaceae].

Known from the Malay Peninsula.

Lenya, Mergui, flowers Feb., *R. N. Parker* 2670. "Parasitic on *Loranthus*."

***Antidesma alatum* Hook. f.** [Euphorbiaceae].

Known from Indo-China and the Malay Peninsula.

Yawngwa Range, Mergui, 1400 ft., March, *R. N. Parker* 2741. Fruit up to .5 in. long.

***Gelonium bifarium* Roxb.** [Euphorbiaceae].

Known from the Andaman Islands and the Malay Peninsula.

Lenya, Mergui, flowers Feb., *R. N. Parker* 2686. "Small tree in second forest growth."

Botryophora Kingii *Hook. f.* [Euphorbiaceae].

Known from Siam and the Malay Peninsula.

Ngawun Reserve, Mergui, flowers and fruit Feb., *R. N. Parker* 2636. "Large shrub, leaves up to 60 × 20 cm., petioles up to 20 cm. long. Panicles pendulous, flowers reddish-purple."

Ficus obpyramidata *King* [Moraceae].

Known from the Malay Peninsula.

Tenasserim River, Mergui, Jan., *R. N. Parker* 2499. "Small branchy tree. Figs greenish-brown with yellow specks on thickly warted branches 10-15 cm. long from the trunk."

Galeola altissima *Reichb. f.* [Orchidaceae].

Known from the Malay Peninsula and Archipelago.

Klong nan kya, Mergui, fruit Feb., *R. N. Parker* 2646. "Leafless climber on a dead tree."

Hornstedtia rubrolutea *Ridl.* [Zingiberaceae].

Known from Siam.

Cinchona Plantations, Mergui, flowers Feb., *R. N. Parker* 2564.

"Stems 10-12 ft. high, leaves about 15 to each stem; flowers scarlet, lip edged yellow."

Smilax leucophylla *Bl.* [Liliaceae]. "

Known from Siam and the Malay Peninsula.

Lenya, Mergui, Feb., *R. N. Parker* 2661. "Large prickly climber in open scrub jungle."

Susum malayanum *Planch.* [Flagellariaceae].

Known from the Malay Peninsula.

Bokpyin, Mergui, flowers March, *R. N. Parker* 1750. "One metre high."

XXXV.—MISCELLANEOUS NOTES.

It is with much pleasure that we record the following from the recent Honours List :—Dr. LEONARD COCKAYNE, Ph.D., F.R.S., received the Honour of the Companionship of The Most Distinguished Order of St. Michael and St. George; Professor Dame HELEN GWYNNE-VAUGHAN, D.B.E., LL.D., D.Sc., was promoted to be Dame Grand Cross, and Mr. E. W. DAVY, Assistant Director of Agriculture, Nyasaland Protectorate, received the Membership, of the Most Excellent Order of the British Empire.

Professor WALTER STILES, F.R.S., professor of botany in the University of Reading, has been appointed to the Mason chair of Botany at the University of Birmingham, made vacant by the death of Professor R. H. Yapp.

Mr. G. A. JONES, formerly Assistant Curator, Botanic Gardens, Dominica, has been appointed Assistant Commissioner of Agriculture for the West Indies.

We regret to record the death on the 23rd of April last, at an advanced age, of an old correspondent of Kew, Dr. LOUIS TRABUT, Professor at the University, and Director of the Government Botanical Service, of Algiers. After graduating in medicine he specialized in botany, upon which he published numerous papers dealing with various branches of the subject between 1878 and 1927. An early paper dealt with the botanical and agricultural regions of Algeria, after which he turned his attention to economic plants, including the Halfa (*Stipa tenacissima*). From 1884 to 1913 he issued, in collaboration with Dr. J. A. Battandier, a "Flore d'Alger," with an Atlas of 47 plates of plants which had not been figured elsewhere (see *Kew Bulletin*, 1914, p. 141). In 1927 he published an exhaustive paper on 'La Tlaïa' (*Tamarix articulata* Vahl), which included an account of its minute anatomy and the insect pests producing galls, which had been shown in a plate (reproduced in this paper) in P. Alpin's *Histoire naturelle de l'Egypte* in 1735. His Algerian Musci and Hepaticae were distributed in Husnot's *Exsiccatae*. In a paper in the *Journal of the Royal Horticultural Society*, xxiv. p. 250 (1900), he contends that many of the *Eucalypti* planted in the Mediterranean region have produced natural hybrids. He also investigated the origin of the cultivated oat.

C. H. W.

IMPERIAL BOTANICAL CONFERENCE, 1930.—A short Imperial Botanical Conference will be held in London immediately before the International Botanical Congress in 1930.

The Conference, which it is intended should last only one day, will meet on Friday, 15th August, at the Imperial College of Science and Technology, South Kensington.

The agenda before the Conference will be purely of a business nature. The proposal to hold a further Imperial Botanical Conference in 1935, on lines similar to that held in 1924, will be discussed, and, if necessary, the appropriate organisation for convening the Conference will be arranged. Reports of the Committees which have dealt with the Resolutions of the 1924 Conference will be received.

Any other business which it is desired to lay before the Conference should be communicated to the Hon. Secretary, Professor W. Brown, Imperial College of Science and Technology, South Kensington, London, S.W.7.